



# MAX30N-72V31K70470

MAX

MAGNETOSTRICTIVE LINEAR ENCODERS

**SICK**  
Sensor Intelligence.



Illustration may differ

### Ordering information

Type	part no.
MAX30N-72V31K70470	1122441

Other models and accessories → [www.sick.com/MAX](http://www.sick.com/MAX)



### Detailed technical data

#### Features

<b>Items supplied</b>	Accessories not included with delivery, please order separately.
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#### Safety-related parameters

<b>MTTF<sub>D</sub> (mean time to dangerous failure)</b>	69 years (EN ISO 13849-1) <sup>1)</sup>
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<sup>1)</sup> This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature of the electronics 60 °C, frequency of use 8,760 h/a. Every 2nd failure of an electronic component is considered hazardous.

#### Performance

<b>Type</b>	30 mm installation housing – IN cylinder mounting
<b>Pressure pipe/End cap</b>	7 mm / Flat
<b>Connection type</b>	Connecting cable, 3-wire, 3,000 mm
<b>Direction of connection</b>	Radial
<b>Measuring range</b>	
Measured values	Positioning
Position (F.S.)	0 mm ... 470 mm <sup>1)</sup>
Null zone	21.5 mm
Damping zone	30 mm
<b>Operating conditions</b>	
Fluid temperature	-30 °C ... +95 °C <sup>2)</sup>
Air humidity	90 % (Condensation not permitted)
Operating pressure P <sub>N</sub>	320 bar
Supply voltage	24 V DC (8 ... 32 V DC)
Switch-on time	< 250 ms
Switch-on current	5,0 A/ 50 μs
Measuring frequency (internal)	2 ms
Transmission rate (cycle time)	Steady
<b>Accuracy</b>	

<sup>1)</sup> F.S. = Full Scale (Measuring range).

<sup>2)</sup> Depends on the maximum fluid temperature, the permissible temperature of the O-ring and the temperature-dependent signal quality of the position magnet.

<sup>3)</sup> Hydraulic oil at operating temperature.

Setpoint tolerance	$\leq \pm 1$ mm
Hysteresis	$\pm 0,1$ mm
Repeatability	Typ. $\pm 0.2$ mm
Linearity	Typ. $\pm 0.25$ mm (measuring range 50 to 500 mm) <sup>3)</sup>
	Typ. $\pm 0.04\%$ F.S. (Measuring range from 500 to 1,500 mm)
<b>Temperature drift</b>	
Warming up phase	Typ. $\leq \pm 0.25$ mm (2 min)
In the operational status	Typ. $\pm 0.25$ mm (measuring range 50 to 500 mm) <sup>3)</sup>
	Typ. $\pm 0.04\%$ F.S. (Measuring range from 500 to 1,500 mm)

<sup>1)</sup> F.S. = Full Scale (Measuring range).

<sup>2)</sup> Depends on the maximum fluid temperature, the permissible temperature of the O-ring and the temperature-dependent signal quality of the position magnet.

<sup>3)</sup> Hydraulic oil at operating temperature.

## Interfaces

<b>Communication interface</b>	Analog
<b>Communication Interface detail</b>	Voltage
<b>Voltage output</b>	9.5 V DC ... 0.5 V DC

## Electronics

<b>Connection type</b>	Connecting cable, 3-wire, 3,000 mm
<b>Electrical operation</b>	
Supply voltage	24 V DC (8 ... 32 V DC)
Residual ripple	< 1% S-S
Power consumption	$\leq 1.25$ W
Current consumption	$\leq 50$ mA
Load resistance	RL $\geq 10$ k $\Omega$
<b>Overvoltage protection during power-up (60 s)</b>	$\leq 36$ V at all poles during power-up (60 s) $\leq 48$ V To GND during power-up (60 s)
<b>Reverse polarity protection</b>	$\leq 36$ V (at all poles) (ISO 16750-2)
<b>Insulation resistance</b>	Riso $\geq 10$ M $\Omega$ , 60 s (ISO 16750-2)
<b>Dielectric strength</b>	500 V DC, 0 V DC (60 s) to housing (R <sub>ISO</sub> $\geq 1$ M $\Omega$ ) (ISO 16750-2)
<b>Short-circuit protection</b>	V <sub>S</sub> – GND on housing

## Mechanics

<b>Dimensions</b>	
Housing	30 mm, 31f7 for IN cylinder mounting – cylinder bore hole 31H8
∅ pressure pipe	7 mm
∅ O-ring	24.99 mm x 3.53 mm
∅ support ring	31 mm x 25.8 mm x 1.4 mm
Length of cable	3,000 mm
<b>Material</b>	
Housing	Stainless steel 1.4305 (AISI 303)
Pressure pipe	Stainless steel 1.4404, AISI 316L
O-ring	NBR 70
Support ring	PTFE

Sheath		PUR
<b>Ambient data</b>		
<b>EMC</b>		EU Directive 2014/30 / EU CE marking
	Generic standards	EN 61000-6-2/61000-6-3
	Agricultural and forestry machinery	EN ISO 14982
	Transient pulses	ISO 7637-2/ISO 16750-2
	ESD (air and contact discharge)	ISO 61000-4-2 / ISO 10605
<b>Vibration</b>		
	Sine	15 g, 24 h / axis, 55 ... 2.000 Hz (IEC 60068-2-6)
	Sine over noise	13 g (r.m.s), 36 h / axis, 10 ... 2.000 Hz (IEC 60068-2-80)
	Broadband noise (resonance peaks removed)	15 g (r.m.s), 48 h / axis, 10 ... 2.000 Hz (IEC 60068-2-64)
<b>Pressure load</b>		
	Operating pressure $P_N$	320 bar
	Overload pressure $P_{max} = P_N \times 1.2$	380 bar
	Test pressure $P_{stat} = P_N \times 1.5$	480 bar
<b>Temperature and air humidity</b>		
	Storage	-20 °C ... +65 °C <sup>1)</sup>
	Operation (electronics)	-40 °C ... +105 °C <sup>2)</sup>
	Maximum air humidity	90 % (Condensation not permitted)
<b>Enclosure rating</b>		
	Housing	IP67 (EN 60529)

<sup>1)</sup> R. H. 55%.

<sup>2)</sup> Taking into account self-heating, generated through constant electrical operation with supply voltage.

## Certificates

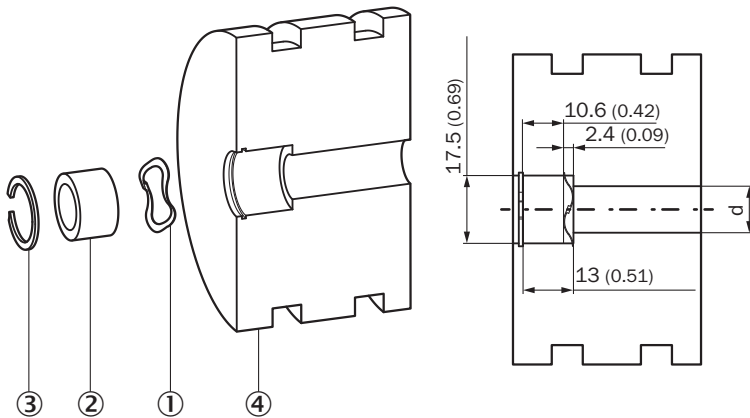
<b>EU declaration of conformity</b>	✓
<b>UK declaration of conformity</b>	✓
<b>ACMA declaration of conformity</b>	✓
<b>Moroccan declaration of conformity</b>	✓
<b>China RoHS</b>	✓
<b>Information according to Art. 3 of Data Act (Regulation EU 2023/2854)</b>	✓

## Classifications

<b>ECLASS 5.0</b>	27270705
<b>ECLASS 5.1.4</b>	27270705
<b>ECLASS 6.0</b>	27270705
<b>ECLASS 6.2</b>	27270705
<b>ECLASS 7.0</b>	27270705
<b>ECLASS 8.0</b>	27270705
<b>ECLASS 8.1</b>	27270705
<b>ECLASS 9.0</b>	27270705
<b>ECLASS 10.0</b>	27270705

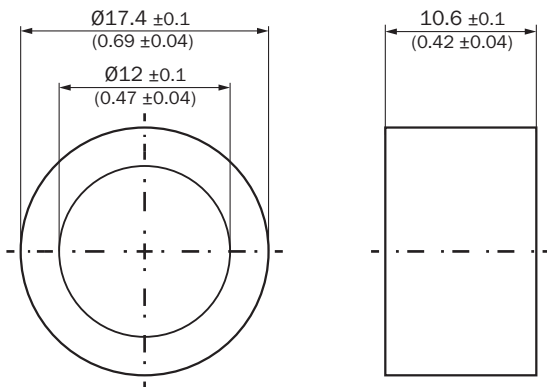
<b>ECLASS 11.0</b>	27270705
<b>ECLASS 12.0</b>	27274304
<b>ETIM 5.0</b>	EC002544
<b>ETIM 6.0</b>	EC002544
<b>ETIM 7.0</b>	EC002544
<b>ETIM 8.0</b>	EC002544
<b>UNSPSC 16.0901</b>	41111613

### installation of position magnet



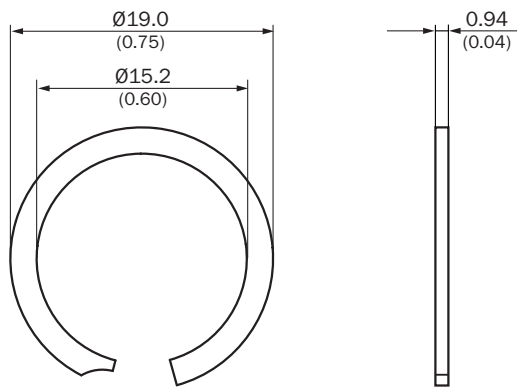
- Dimensions in mm (inch)
- ① corrugated spring washer
  - ② Position magnet
  - ③ circlip
  - ④ piston

### Position magnet



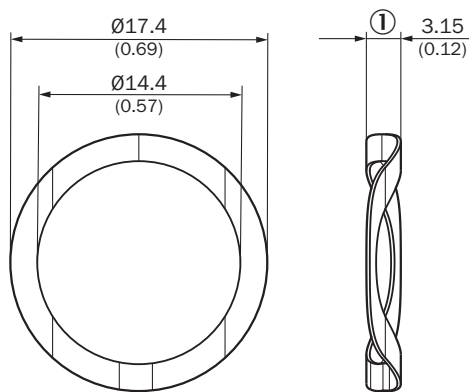
Dimensions in mm (inch)

circlip



Dimensions in mm (inch)

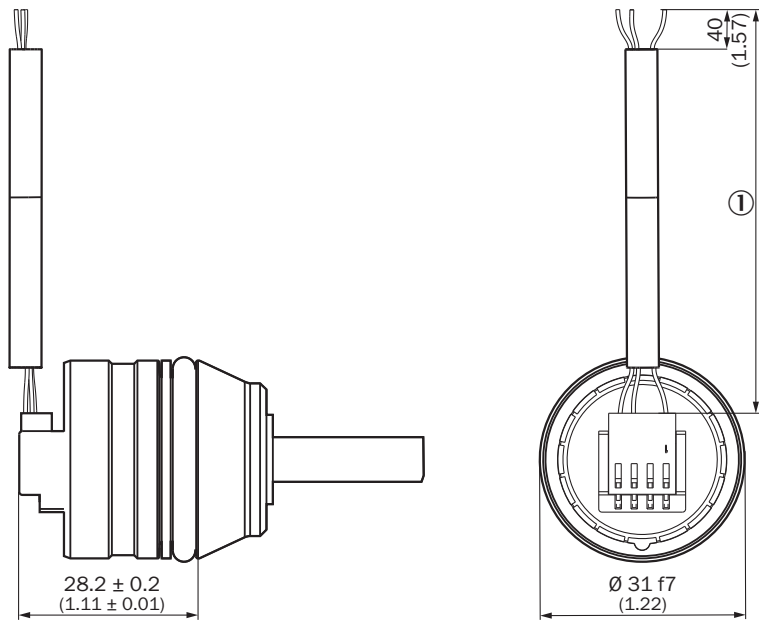
corrugated spring washer



Dimensions in mm (inch)

① Free height

Dimensional drawing Cable, 3-wire

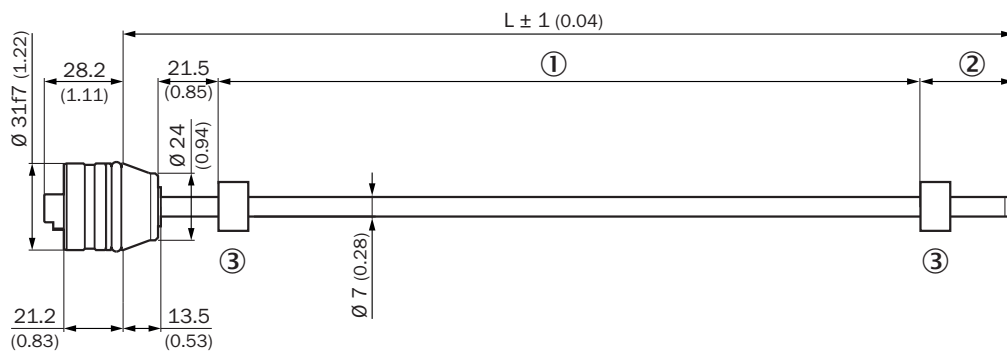


Dimensions in mm (inch)

① Cable length

Wire color	Connection
Brown	VDC
Blue	GND
Black/white	SIG (V)/SIG (mA)

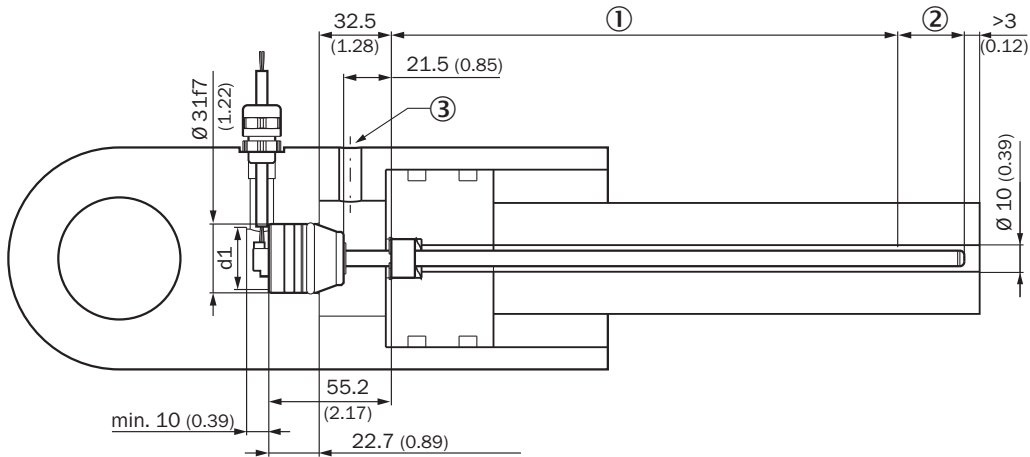
Dimensional drawing MAX30N



Dimensions in mm (inch)

- ① Measuring range
- ② damping zone
- ③ Position magnet

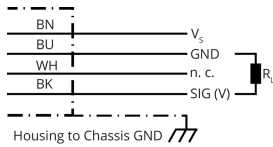
Attachment specifications Installation cavity for the piston rod and pressure pipe



Please note the information in the operating instructions ( $d: 32 \leq d1 \leq 40$ ).

- ① Measuring range
- ② damping zone
- ③ Hydraulic port

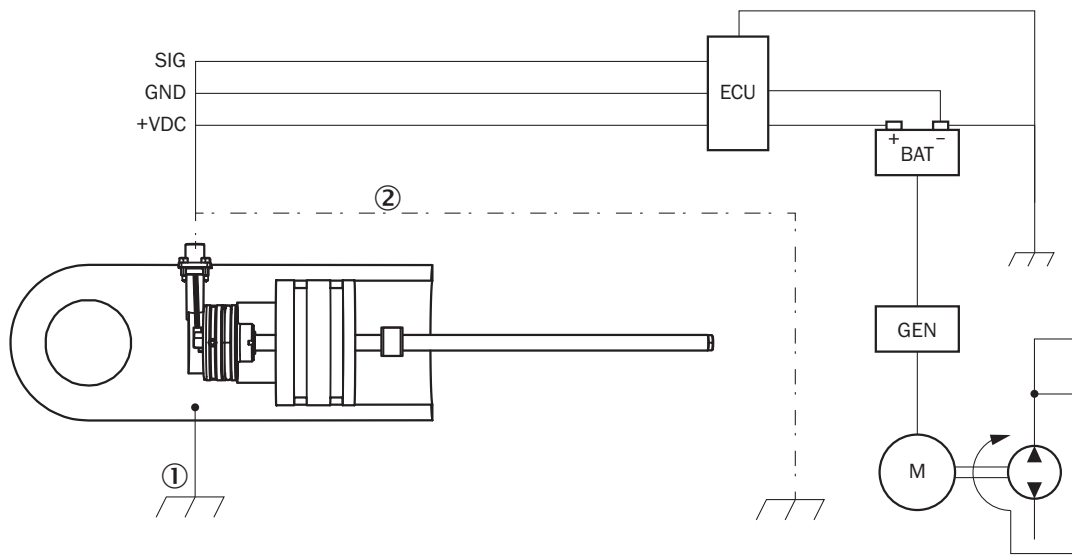
PIN assignment



Wire color	Signal	Function
Brown	$V_s$	+12 V / +24 V
Blue	GND	0 V
Black	SIG (V, PWM)	<b>Interface</b>
White	n.c.	Not assigned
Load	$R_L$	$R_L \geq 10 \text{ k}\Omega$






Connection diagram

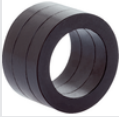
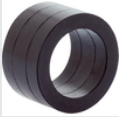





connection diagram  
① Chassis GND  
② Cable shielding (optional)

Recommended accessories

Other models and accessories → [www.sick.com/MAX](http://www.sick.com/MAX)

	Brief description	Type	part no.
<b>Mounting systems</b>			
	<ul style="list-style-type: none"> <li><b>Description:</b> Retaining ring for installing the position magnets in the piston of the hydraulic cylinder</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> Stainless steel 1.4319</li> <li><b>Packing unit:</b> 1 piece</li> </ul>	BEF-MK-SR-01	2116437
	<ul style="list-style-type: none"> <li><b>Description:</b> Retaining ring for installing the position magnets in the piston of the hydraulic cylinder</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> Stainless steel 1.4319</li> <li><b>Packing unit:</b> 5 pieces</li> </ul>	BEF-MK-SR-05	2116438
	<ul style="list-style-type: none"> <li><b>Description:</b> Retaining ring for installing the position magnets in the piston of the hydraulic cylinder</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> Stainless steel 1.4319</li> <li><b>Packing unit:</b> 10 pieces</li> </ul>	BEF-MK-SR-10	2116439
	<ul style="list-style-type: none"> <li><b>Description:</b> Retaining ring for installing the position magnets in the piston of the hydraulic cylinder</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> Stainless steel 1.4319</li> <li><b>Packing unit:</b> 50 pieces</li> </ul>	BEF-MK-SR-50	2116440
	<ul style="list-style-type: none"> <li><b>Description:</b> Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> 1.4568 (17-7 PH Condition CH900)</li> <li><b>Packing unit:</b> 1 piece</li> </ul>	BEF-MK-WF-01	2116431
	<ul style="list-style-type: none"> <li><b>Description:</b> Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> 1.4568 (17-7 PH Condition CH900)</li> <li><b>Packing unit:</b> 5 pieces</li> </ul>	BEF-MK-WF-05	2116432
	<ul style="list-style-type: none"> <li><b>Description:</b> Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> 1.4568 (17-7 PH Condition CH900)</li> <li><b>Packing unit:</b> 10 pieces</li> </ul>	BEF-MK-WF-10	2116433
	<ul style="list-style-type: none"> <li><b>Description:</b> Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> 1.4568 (17-7 PH Condition CH900)</li> <li><b>Packing unit:</b> 50 pieces</li> </ul>	BEF-MK-WF-50	2116435

	Brief description	Type	part no.
magnets			
	<ul style="list-style-type: none"> <li><b>Product segment:</b> Magnets</li> <li><b>Product:</b> Position magnets</li> <li><b>Description:</b> Position magnet for magnetostrictive linear encoders Installation: in hydraulic cylinder using corrugated spring washer SICK part no. 2116431 Temperature range: -30 °C ... +95 °C Dimensions: 17.4x12x10.6 mm Media: lubricants, hydraulic oils, no aggressive fluids (e.g., acids or bases)</li> </ul>	MAG-O-174-01	2112714
	<ul style="list-style-type: none"> <li><b>Product segment:</b> Magnets</li> <li><b>Product:</b> Position magnets</li> <li><b>Description:</b> Position magnet for magnetostrictive linear encoders Installation: in hydraulic cylinder using corrugated spring washer SICK part no. 2116431 Temperature range: -30 °C ... +95 °C Dimensions: 17.4x12x10.6 mm Media: lubricants, hydraulic oils, no aggressive fluids (e.g., acids or bases)</li> </ul>	MAG-O-174-05	2112713
	<ul style="list-style-type: none"> <li><b>Product segment:</b> Magnets</li> <li><b>Product:</b> Position magnets</li> <li><b>Description:</b> Position magnet for magnetostrictive linear encoders Installation: in hydraulic cylinder using corrugated spring washer SICK part no. 2116431 Temperature range: -30 °C ... +95 °C Dimensions: 17.4x12x10.6 mm Media: lubricants, hydraulic oils, no aggressive fluids (e.g., acids or bases)</li> </ul>	MAG-O-174-10	2115045
	<ul style="list-style-type: none"> <li><b>Product segment:</b> Magnets</li> <li><b>Product:</b> Position magnets</li> <li><b>Description:</b> Position magnet for magnetostrictive linear encoders Installation: in hydraulic cylinder using corrugated spring washer SICK part no. 2116431 Temperature range: -30 °C ... +95 °C Dimensions: 17.4x12x10.6 mm Media: lubricants, hydraulic oils, no aggressive fluids (e.g., acids or bases)</li> </ul>	MAG-O-174-50	2112711
connectors and cables			
		BEF-EA-M12-S	2117513

## SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

## WORLDWIDE PRESENCE:

Contacts and other locations –[www.sick.com](http://www.sick.com)